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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/036,485	01/07/2002	Kiyoshi Arita	MEIC: 118	3565

7590

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EXAMINER

GEYER, SCOTT B

ART UNIT

PAPER NUMBER

2829

DATE MAILED: 04/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/036,485

Applicant(s)

ARITA ET AL.

Examiner

Scott B. Geyer

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 March 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The specification as amended by the applicant is acceptable.

Claim Objections

2. Claim 6 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 6 recites a concentration ratio range of sulfur hexafluoride to helium including 1:1. A 1:1 ratio means the two gases are present in equal portions, and the independent claim 1 recites the plasma-generating gas as containing *more* helium than sulfur hexafluoride. For purposes of examination, the ratio of 1:1 (halogen-containing gas : carrier gas) is read as 1:>1, such that the carrier gas is stated as being in a slightly greater concentration than the etchant gas, which is concurrent with claim 1.

Claim Rejections - 35 USC § 102

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1, 2, 3, 6 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Cohen et al. (6,110,836).

4A. As to *claim 1*, Cohen et al. teach a plasma for etching an object as composed of a halogen-containing etchant gas and a carrier gas (see column 3, lines 17-23 and also lines 57 et seq.). Cohen et al. further teach sulfur hexafluoride as one of

several halogen-containing gases and helium as a carrier gas. The object to be etched is a substrate 54 as shown in figure 1 which is mounted on a support 42 within the chamber 40. The gases are introduced to the chamber via a gas inlet 76. The plasma is generated with a RF power source 74. Cohen et al. also teach the gas mixture as containing less halogen-containing gas than carrier gas (column 4, lines 12-22). The object is etched by the plasma, which causes reactant products (see column 3, lines 57-67, continued to column 4, lines 1-11) and the reactant material is carried out of the chamber by the carrier gas (i.e. helium) through a gas exhaust 78.

4B. As to *claim 2*, Cohen et al. teach a high-frequency voltage applied to the substrate support (mounting unit) (see column 3, lines 24-39). The plasma gas is applied through a gas inlet 76 which is opposite the mounting unit as shown in figure 1.

4C. As to *claim 3*, Cohen et al. teach etching a substrate 54, which clearly has a first and second side, within the plasma etching chamber as shown in figure 1. Cohen et al. also teach, in the background of their invention, plasma etching as related to silicon wafers (see column 1, lines 10 et seq.). As to the language of claim 3, lines 3-7, specifically "and the second side includes a damaged-layer...causing removal of the damaged-layer", applicant should note that this is merely "intended use" language which cannot be relied upon to define over Cohen et al., since Cohen et al. discloses all of the claimed steps and their recited relationships. Moreover, the examiner will presume that the recited intended use is inherent in Cohen et al., since all of the claimed steps and the relationships therebetween are met by Cohen et al. Specifically, Cohen et al. teach mounting a wafer in a chamber and etching the wafer, whereby the etching step

removes material from the surface of the wafer. If the recited use is not inherent in Cohen et al., then this would mean that the applicant has failed to recite one or more critical features of the present invention.

4D. As to **claim 6**, Cohen et al. teach in column 4, lines 15 et seq., as an example, that the relative amount of halogen-containing gas is below about 20%. Assuming 20% for this example, then the halogen-containing gas to carrier gas ration is below about 20%:80%, or 1:4. Therefore, Cohen et al. teach the recited range of claim 6, since a ratio below about 1:4 of halogen-containing gas-to-carrier gas (as stated in column 4) is well within the range of 1:>1 to 1:10 (see also paragraph 2 above).

4E. As to **claim 7**, Cohen et al. teach helium used in the plasma gas mixture as a carrier gas. The carrier gas acts to carry excess plasma etchant and reactants from the object which is etched.

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Claim Rejections - 35 USC § 103

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen et al. (6,110,836) as applied to claim 3 above, and further in view of Yoshida et al. (5,575,887).

6A. As to **claim 4**, Cohen et al. do not teach a protective sheet affixed to a first side of a wafer wherein etching the object includes the sub-step of etching the wafer with the protective sheet mounted to the mounting unit. However, Yoshida et al. teach a

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plasma etching method for etching a wafer substrate 6, as shown in figure 1. One side of the wafer substrate has transistor components and is coated with an insulating film (protective sheet) 61 (column 3, lines 57 et seq.). The surface of the wafer opposite the side with circuitry, which is the surface to be etched by the plasma, is open to the plasma gas as shown in the plasma chamber in figure 1. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the method of Cohen et al. with a protective sheet as taught by Yoshida et al. so as to protect the delicate electrical circuitry of the wafer during the etching process.

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7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen et al. (6,110,836) and Yoshida et al. (5,575,887) as applied to claim 4 above, and further in view of Blalock et al. (6,413,875 B1).

7A. As to **claim 5**, neither Cohen et al. nor Yoshida et al. teach cooling of the mounting unit during the etching process. However, Blalock et al. teach actively cooling the entire chamber during the etching process, which would thus also cool the mounting unit, by flowing inert gas into the chamber (column 3, lines 17-23). At the time of the invention, it would have been obvious to modify the method of Cohen et al. and Yoshida et al. to include a cooling step as taught by Blalock et al. so as to control and maintain etch selectivity.

Response to Arguments

8. Applicant's arguments with respect to claims 1-5 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion


9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott B. Geyer whose telephone number is (703) 306-5866. The examiner can normally be reached on weekdays, between 10:00am - 6:30pm. The examiner may also be reached via e-mail: scott.geyer@uspto.gov

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (703) 308-1233. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

SCOTT GEYER
PATENT EXAMINER

SBG
March 24, 2003


KAMAND CUNEO
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